

PURCHASE DESCRIPTION

WIDEBAND MICROWAVE SIGNAL GENERATOR (50 MHz to 26.5 GHz)

FSNTP-C

- 1.0 GENERAL This procurement requires an all solid state, synthesized, wideband microwave signal generator covering a frequency range of 50 MHz to 26.5 GHz and including the ability to measure external frequencies\* and external power levels. Plug-ins are NOT acceptable for any portion of this equipment.
- 2.0 CLASSIFICATION The signal generator described herein shall meet the requirements of MIL-T-28800( ), Type III, Class 5, Style E, Color R for Navy shipboard, submarine and shore applications with the following modifications and exceptions:
- a. The Electromagnetic Interference requirements of MIL-T-28800( ) are limited to CE03, CS01, CS02 (0.05 to 100 MHz), CS06, RE02 (14 kHz to 10 GHz), and RS03.
  - b. The warm-up time is extended to one hour.
- 3.0 OPERATIONAL REQUIREMENTS
- 3.1 Frequency Characteristics
- 3.1.1 Range: 50 MHz to 26.5 GHz
  - 3.1.2 Resolution: The displayed frequency resolution shall be at least 1 kHz.
  - 3.1.3 Accuracy (CW mode): Same as reference standard
  - 3.1.4 Stability: Less than 1 pp 10<sup>9</sup>/h after one hour warm-up
  - 3.1.5 Spectral Purity (at least the limits specified below)
    - 3.1.5.1 Harmonics/Sub-harmonics: At least -55 dBc
    - 3.1.5.2 Non-harmonics/Spurious: At least -55 dBc
    - 3.1.5.3 Phase Noise: At least -70 dBc/Hz at an offset 20 kHz
    - 3.1.5.4 Residual FM (BW = 50 Hz to 15 kHz)
      - < 200 Hz rms [F < 2 GHz]
      - < 400 Hz rms [F > 2 GHz]
  - 3.1.6 Reference Frequency
    - 3.1.6.1 Internal Reference Output: 10 MHz; > 0.5 Vrms into 50 ohms
    - 3.1.6.2 External Reference Input: 10 MHz; > 0.2 Vrms into 50 ohms
    - 3.1.6.3 External Reference Output: 10 MHz; > 0.5 Vrms into 50 ohms
  - 3.1.7 Frequency Lock Indicator: A light shall be provided which shall indicate that the output frequency is phase locked to the reference frequency.
- 3.2 Output Characteristics {L = Output level in dBm}
- 3.2.1 Impedance/Connector: 50 ohms / precision 3.5 mm male or female (SMA compatible)
    - 3.2.1.1 VSWR: Less than 2:1 [L < 0 dBm]
  - 3.2.2 Level: -99 dBm to +10 dBm leveled
  - 3.2.3 Resolution: 0.1 dBm in a digital readout
  - 3.2.4 Accuracy (displayed level vs measured output level)
    - ±1.0 dB from 0.05 to 18 GHz; ±2.0 dB from 18 to 26.5 GHz [L > -40 dBm]

Additional  $\pm 0.2$  dB/10 dB step

[L < -40 dBm]

- 3.2.5 Level Control Indicator: A light shall be provided which shall indicate that the output signal level is under active control of the feedback circuit in the leveling loop. An unleveled indication on this display shall mean that the output amplitude is unleveled regardless of the actual amplitude measured at the output.

### 3.3 Modulation Characteristics

#### 3.3.1 Pulse Modulation (internal)

- 3.3.1.1 Rate: 10 Hz to 1 MHz
- 3.3.1.2 Width: 0.1  $\mu$ s to 100 ms
- 3.3.1.3 Rise/Fall Time: Less than 25 ns
- 3.3.1.4 Overshoot/Undershoot/Ringing:  $\pm 2.0$  dB maximum
- 3.3.1.5 Settling Time:  $\pm 1.0$  dB of the final value within 100 ns
- 3.3.1.6 On/Off Ratio: Greater than 80 dB

#### 3.3.2 Pulse Modulation (external)

- 3.3.2.1 Rate: 10 Hz to 1 MHz
- 3.3.2.2 Width: 0.1  $\mu$ s to 100 ms
- 3.3.2.3 Triggering: Rising or falling edge
- 3.3.2.4 Sync Output: Modulation waveform, TTL compatible

### 3.4 Digital Sweep Characteristics

- 3.4.1 Range: 50 MHz to 26.5 GHz
- 3.4.2 Step Size: 1 kHz or less to 100 MHz
- 3.4.3 Step Time: Variable, 1 step/10 ms to at least 1 step/sec
- 3.4.4 Ramp Output: 0 to 10 volts, proportional to the frequency between selected sweep limits
- 3.4.5 Output Flatness: Within  $\pm 1.0$  dB to 18 GHz;  $\pm 2.0$  dB from 18 to 26.5 GHz
- 3.4.6 Sweep Mode: Auto (continuous), single, single step, reset
- 3.4.7 Sweep Trigger: External input for triggering sweep, TTL compatible
- 3.4.8 Pen Lift: TTL compatible output, high level during retrace

### 3.5 Power Meter

- 3.5.1 Frequency Range: 50 MHz to 26.5 GHz
- 3.5.2 External Measurement Range: +10 dBm to -30 dBm
- 3.5.3 Accuracy (indicated power level vs externally measured level):  
 $\pm 1.0$  dB (+10 dBm to -10 dBm);  $\pm 2.0$  dB (-10 dBm to -30 dBm)
- 3.5.4 Display (digital): 3.5 digits minimum
- 3.5.4.1 Resolution: 0.1 dB minimum for all power readings
- 3.5.5 Input Connector: Precision 3.5 mm male or female (SMA compatible)

### 3.6 Frequency Counter\*

- 3.6.1 Input Range: At least 100 MHz to 26.5 GHz
- 3.6.2 Resolution: At least 100 Hz
- 3.6.3 Sensitivity: -25 dBm to 18 GHz; -20 dBm from 18 to 26.5 GHz

- 3.6.4 Mode: CW or Pulsed RF Input
- 3.6.4.1 Minimum PW for Pulsed RF Input: 0.5  $\mu$ s
- 3.6.5 Accuracy: (CW) At least 1 ppm
- 3.6.6 Input Impedance: 50 ohms nominal
- 3.6.7 Input Connector: Precision 3.5 mm male or female (SMA compatible)

#### 4.0 GENERAL REQUIREMENTS

- 4.1 Power: 115/230 Vac  $\pm$ 10% single phase 50, 60 or 400 Hz, 350 watts maximum
- 4.2 Volume: Less than 65,548 cm<sup>3</sup> (4,000 in<sup>3</sup>)
- 4.3 Weight: Less than 29.55 kg (65 lb)
- 4.4 Calibration Interval: The calibration interval shall be at least 12 months minimum. The equipment shall be within all accuracy requirements specified herein, with a 85% or greater confidence factor following a calibration interval of 12 months.

- 4.5 Remote Control: The generator shall be capable of being remotely controlled via the IEEE-488 interface bus, operating as both a talker and listener, having at least the following subset of bus functions: AH1, L4, SH1, T6, SR1, DC1 and RL1. Control of the following parameters is required:
 

Output Frequency Amplitude (-99 to +10 dBm) Function Modulation: 1 $\mu$ s PW; 1 kHz PRF Status	External Power MeasureOutput External Frequency MeasureSweep Frequency Lock StatusAmplitude Level
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#### 5.0 ACCESSORIES The following list of accessories shall be provided with each equipment.

- 5.1 One Gore-tex GMCA 190-1265 or equivalent coaxial cable, 6 ft long, with male precision 3.5 mm SMA compatible connectors or equivalent on each end
- 5.2 One Gore-tex GMCA 190-1265 or equivalent coaxial cable, 18 in long, with male precision 3.5 mm SMA compatible connectors or equivalent on each end
- 5.3 One male to female adapter with precision 3.5 mm SMA compatible connector or equivalent
- 5.4 One female to female adapter with precision 3.5 mm SMA compatible connector or equivalent

\* Frequency counter may be supplied as a separate piece of equipment; however, weight and volume restrictions apply to signal generator packages only.